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09/188,399	11/06/1998	MARK BODDY	256.029US1	4315

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EXAMINER

GARLAND, STEVEN R

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 22

Application Number: 09/188,399
Filing Date: November 06, 1998
Appellant(s): BODDY ET AL.

Bradley A. Forrest
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 14, 2003.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The appellant's statement of the status of amendments after final rejection contained in the brief is incorrect.

The amendment after final rejection filed on July 17,2003 has been entered.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

Appellant's brief includes a statement that claims 1-3,5-8,10,11,13-19,27-29, and 32-34 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

Appellant's brief includes a statement that claims 1-11,14,15,19,27-29,33, and 34 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

Goldman et al. " A Constraint-Based Scheduler for Batch Manufacturing" IEEE Expert, Vol. 12, No. 1, 1997, pages 49-56.

6,216,109	ZWEBEN et al.	4-2001
5,353,229	TANAKA	10-1994

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-3,5-8,10,11,13-19, 27-29, and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Goldman et al. article " A Constraint-Based-Scheduler for Batch Manufacturing" (copy supplied by applicant) in view of Tanaka 5,353,229.

Goldman et al. teaches constraint based scheduling using discrete and continuous constraints, determining infeasible schedules, breaking tasks into activities and sub activities, use of deadlines, identifying required resources, dynamic backtracking, schedule modification, use of solver engines, assigning resources, identifying a culprit activity and suboptimalities, modifying constraints, determining if an activity is larger than a threshold, and use of start and end times. See pages 49-56 and

note figures 1 and 2. Further Goldman teaches resizing and use of constraints in figure A, and pages 52-55.

Goldman however does not expressly state that the continuous constraints are related to other variables by linear mathematical relationships

Tanaka teaches expressing constraints as linear combinations of variables. See col. 1, lines 39-55.

It would have been obvious to one of ordinary skill in the art to modify Goldman in view of Tanaka and express the continuous constraints by a linear mathematical formula so that the constraints can be accurately related to the variables and also allow ease in computation.

Goldman et al. and Tanaka however do not specifically teach storing the software on a medium.

It would have been obvious to one of ordinary skill in the art to modify Goldman and Tanaka to store the software on a medium as a backup copy in case the system crashes and also allow for easily loading the software on system startup.

In response to applicant's arguments, Goldman teaches the use of both continuous and discrete constraints along with resizing. Note the example given of batch manufacturing in the boxes on the tops of pages 52 and 53 which shows various levels of granularity subject to various constraints (note in addition the breakdown of the general recipe into a site recipe and unit recipes); also note on page 52, middle column in the second full paragraph sub-activities are specifically mentioned. In response to applicant's argument about linear mathematical relationships, the instant

specification defines the continuous constraints in various manners and also gives specific examples of them as set forth on page 1, lines 15-20; page 7, lines 22-26; page 10, lines 26-27; page 13, lines 9-20; etc. Guidance is given in the instant specification as to the meaning of continuous constraints such as on page 13, lines 19-20, which states that "temporal relationships are explicitly included as continuous constraints in the schedule constraint model." and on page 1, lines 16-20 which state in part " A second type of constraint is continuous or dynamic in nature. These types of constraints involve the duration of an activity,... ".

Claims 1-11, 14,15,19,27-29,33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zweben et al. 6,216,109, *in view of Tanaka*

Zweben et al. teaches constraint based scheduling using continuous and discrete constraints, use of a memory to store the software, use of deadlines and start and end times, splitting tasks into subtasks, identifying required resources to perform a task, resource balancing, identifying infeasibilities, schedule modification, assigning resources, modifying constraints, determining if an activity is larger than a threshold, determining if an activity occurs slower than a predetermined threshold, and use of start and end times. See the abstract, figures, col. 1, lines 39-65; col. 2, lines 1-6; col. 9, lines 30-47; col. 14, lines 6-42; col. 15, line 33 to col. 16, line 61; col. 25, line 45 to col. 26, line 58; and the claims.

Zweben however does not specifically teach that the continuous constraints are related to other variables by linear mathematical relationships.

Tanaka teaches expressing constraints as linear combinations of variables. See col. 1, lines 39-55.

It would have been obvious to one of ordinary skill in the art to modify Zweben in view of Tanaka and express the continuous constraints by a linear mathematical formula so that the constraints can be accurately related to the variables and also allow ease in computation.

. In response to applicant's argument about linear mathematical relationships, the instant specification defines the continuous constraints in various manners and also gives specific examples of them as set forth on page 1, lines 15-20; page 7, lines 22-26; page 10, lines 26-27; page 13, lines 9-20; etc. Note that page 13, lines 19-20, which states that "temporal relationships are explicitly included as continuous constraints in the schedule constraint model." and on page 1, lines 16-20 which state in part "A second type of constraint is continuous or dynamic in nature. These types of constraints involve the duration of an activity,... ". In regards to the splitting aspect, applicant should note col. 16, lines 4-61.

(11) Response to Argument

In regards to the resizing of Goldman, note is taken that in addition to the sections pointed out above that in addition it is taught in the section "Batch manufacturing: a complex and dynamic environment " on pages 52 and 53 that in general that a vessel size constrains the amount of product that can produced in a single batch implying that if that desired amount exceeds the machine capacity that the multiple batches are required to produce the desired total amount. Further in regards to

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the site and unit recipes the overall site recipe is divided into smaller unit recipes such as the step performed by the premixer and the step performed by the reactor which are performed in the a specified order and the reactor step includes a continuous constraint in the form a time constraint (again note the example on page 13, lines 19-20 of the instant specification).

In regards to arguments about continuous constraints having linear mathematical relationships with variables Tanaka is being relied for the express teaching that constraints can be expressed as a linear combination of variables. (col. 1, lines 39-55, of Tanaka) This provides a motivation to modify Goldman or Zweben to include their use since this would allow ease in computation by not requiring nonlinear computations.

In regards to the arguments about the integrated implications of the integrated implications of the discrete and continuous constraints, clearly the when the schedule takes into account both constraints such as the vessel or batch size along with the time constraints then the integrated implications are being considered.

In regards to the arguments about modifying constraints, Goldman teaches modifying constraints such as the extreme case of modification by elimination of a constraint if the schedule is unworkable and relaxing constraints. Note page 49, middle column, first paragraph; and page 54, third column, first paragraph for example.

In regards to arguments about claim 18, the claim recites the alternatives of chronological backtracking or dynamic backtracking. Goldman specifically teaches dynamic backtracking starting on page 55, first column, in the paragraph " Supporting facilities ".

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In regards to the arguments about Zweben, Zweben in column 13, lines 22-35; and in col. 15, line 33 to col. 16, line 61, teaches capacity constraints and in column 16, lines 52-58, teaches splitting a task into subtasks and enforcing other constraints during each of the subtasks which clearly includes the integrated implications of the discrete and continuous constraints. In regards to the modification of constraints Zweben teaches modifying constraints in the abstract, in the last seven lines for example.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Steven R. Garland

Steven R Garland

Examiner

Art Unit 2125

January 22, 2004

Conferees

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